



Daniel Spielman

Professor of Radiology (Radiological Sciences Lab) and, by courtesy, of Electrical Engineering

 NIH Biosketch available Online

Bio

BIO

My interests are in the field of in vivo magnetic resonance imaging (MRI) and spectroscopy (MRS) and the development of new methods of imaging metabolism within the body. Current projects include ¹³C MRS of hyperpolarized substrates for the assessment of glycolysis, oxidative phosphorylation, and other key metabolic pathways, optimized mapping of ¹H metabolite distributions throughout the body, and quantifying neurotransmitter levels and cycling rates in the brain. In our laboratory, we have focussed on a novel array of both acquisition and analysis techniques for use in preclinical and clinical studies. These developments, which include improved spectroscopic imaging and shimming methods, multinuclear NMR studies, application of estimation theory for optimal data quantification, and the synthesis of new hyperpolarizable ¹³C probes, address the inherent difficulties of low concentrations of the desired components, overlapping resonances, and magnetic field inhomogeneities caused by imperfect magnets and magnetic susceptibility variations with the body. Primary applications of this work include cancer diagnosis, treatment monitoring, and prediction of response to therapy, assessment of cardiac function, improved understanding and treatment of metabolic diseases (e.g. diabetes, liver failure) and neurologic disorders including Alzheimer's disease, schizophrenia, and epilepsy.

ACADEMIC APPOINTMENTS

- Professor, Radiology
- Professor (By courtesy), Electrical Engineering
- Member, Bio-X
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Stanford Cancer Institute
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- Academy of Radiology Research Council Distinguished Investigator Award, Academy of Radiology (2012)

PROFESSIONAL EDUCATION

- Ph.D., Stanford University , Electrical Engineering (1991)
- MS, Stanford University , Statistics (1987)
- MS, Stanford University , Electrical Engineering (1984)
- BS, MIT , Electrical Engineering (1983)

LINKS

- The Spielman Laboratory: <http://med.stanford.edu/spielmangroup.html>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

My research interests are in the field of medical imaging, particularly magnetic resonance imaging and in vivo spectroscopy. While magnetic resonance imaging (MRI) has been advancing at a rapid pace during the past decade, and provides excellent contrast between organs and lesions and exquisite anatomical detail, the promise that in vivo MR spectroscopy holds for revealing functional and physiological information will likely be realized in the decade to come. Many exciting correlations have been obtained between various MR spectroscopic components (e.g., metabolites such as lactate and choline) and disease diagnosis and treatment. However, until these can be robustly presented with high spatial resolution, high signal-to-noise ratio (SNR), and reasonable imaging times, they will remain primarily in the laboratory. Thus, current research in our laboratory has focussed on an array of novel techniques for producing clinically valuable images of these important metabolic components. These approaches, which include improved spectroscopic imaging and shimming methods as well as the application of estimation theory for optimal data quantification, address the inherent difficulties of low concentrations of the desired components, overlapping resonances, and field inhomogeneities caused by imperfect magnets and magnetic susceptibility variations with the body. Applications of this work include cancer diagnosis, treatment monitoring, and prediction of response to therapy. In addition, we are conducting basic research into a variety of neurologic conditions including brain development in pediatric patients and neurodegeneration associated with Alzheimer's disease, alcoholism, and aging.

These research activities are in collaboration with faculty and staff in various departments of the Medical School and in the School of Engineering, and I advise graduate students in various degree programs including Biophysics, Bioengineering, Electrical Engineering, and Medical Informatics.

Teaching

COURSES

2018-19

- In Vivo MR: Relaxation Theory and Contrast Mechanisms: RAD 226B (Spr)
- In Vivo MR: SpinPhysics and Spectroscopy: BIOE 326A, RAD 226A (Win)

2016-17

- In Vivo MR: Relaxation Theory and Contrast Mechanisms: BIOE 326B, RAD 226B (Spr)
- In Vivo MR: SpinPhysics and Spectroscopy: BIOE 326A, RAD 226A (Win)

STANFORD ADVISEES

Doctoral Dissertation Advisor (AC)

Keshav Datta

Doctoral (Program)

Patricia Lan

Publications

PUBLICATIONS

- **Multimodality Hyperpolarized C-13 MRS/PET/Multiparametric MR Imaging for Detection and Image-Guided Biopsy of Prostate Cancer: First Experience in a Canine Prostate Cancer Model** *MOLECULAR IMAGING AND BIOLOGY*
Bachawal, S. V., Park, J., Valluru, K. S., Loft, M., Felt, S. A., Vilches-Moure, J. G., Saenz, Y. F., Daniel, B., Iagaru, A., Sonn, G., Cheng, Z., Spielman, D. M., Willmann, et al
2019; 21 (5): 861–70
- **Detection of Metabolic Changes using Hyperpolarized C-13 MRI in a Negative F-18-FDG PET Rat Brain Cancer Model**

Lauritzen, M., Datta, K., Merchant, M., Jang, T., Hurd, R., Liu, S., Recht, L., Spielman, D.
SOC NUCLEAR MEDICINE INC.2019

- **Effects of acute N-acetylcysteine challenge on cortical glutathione and glutamate in schizophrenia: A pilot in vivo proton magnetic resonance spectroscopy study** *PSYCHIATRY RESEARCH*
Girgis, R. R., Baker, S., Mao, X., Gil, R., Javitt, D. C., Kantrowitz, J. T., Gu, M., Spielman, D. M., Ojeil, N., Xu, X., Abi-Dargham, A., Shungu, D. C., Kegeles, et al
2019; 275: 78–85
- **Effects of acute N-acetylcysteine challenge on cortical glutathione and glutamate in schizophrenia: A pilot in vivo proton magnetic resonance spectroscopy study.** *Psychiatry research*
Girgis, R. R., Baker, S., Mao, X., Gil, R., Javitt, D. C., Kantrowitz, J. T., Gu, M., Spielman, D. M., Ojeil, N., Xu, X., Abi-Dargham, A., Shungu, D. C., Kegeles, et al
2019; 275: 78–85
- **Multimodality Hyperpolarized C-13 MRS/PET/Multiparametric MR Imaging for Detection and Image-Guided Biopsy of Prostate Cancer: First Experience in a Canine Prostate Cancer Model.** *Molecular imaging and biology : MIB : the official publication of the Academy of Molecular Imaging*
Bachawal, S. V., Park, J. M., Valluru, K. S., Loft, M. D., Felt, S. A., Vilches-Moure, J. G., Saenz, Y. F., Daniel, B., Iagaru, A., Sonn, G., Cheng, Z., Spielman, D. M., Willmann, et al
2019
- **Comparison of dynamic brain metabolism during antegrade cerebral perfusion versus deep hypothermic circulatory arrest using proton magnetic resonance spectroscopy.** *The Journal of thoracic and cardiovascular surgery*
Hanley, F. L., Ito, H., Gu, M., Hurd, R., Riemer, R. K., Spielman, D.
2019
- **Reversed metabolic reprogramming as a measure of cancer treatment efficacy in rat C6 glioma model.** *PloS one*
Datta, K., Lauritzen, M. H., Merchant, M., Jang, T., Liu, S. C., Hurd, R., Recht, L., Spielman, D. M.
2019; 14 (12): e0225313
- **Hyperpolarized 13C MRI: Path to Clinical Translation in Oncology.** *Neoplasia (New York, N.Y.)*
Kurhanewicz, J., Vigneron, D. B., Ardenkjaer-Larsen, J. H., Bankson, J. A., Brindle, K., Cunningham, C. H., Gallagher, F. A., Keshari, K. R., Kjaer, A., Laustsen, C., Mankoff, D. A., Merritt, M. E., Nelson, et al
2018; 21 (1): 1–16
- **Metabolic markers, regional adiposity, and adipose cell size: relationship to insulin resistance in African-American as compared with Caucasian women.** *International journal of obesity (2005)*
Allister-Price, C., Craig, C. M., Spielman, D., Cushman, S. S., McLaughlin, T. L.
2018
- **A Metabolic Therapy for Malignant Glioma Requires a Clinical Measure** *CURRENT ONCOLOGY REPORTS*
Corbin, Z., Spielman, D., Recht, L.
2017; 19 (12): 84
- **Comprehensive Examination of the GABAergic System in Adults With Autism by Simultaneous [18F] Flumazenil-Positron Emission Tomography and Magnetic Resonance Spectroscopy**
Fung, L., Flores, R., Liu, K., Gu, M., Spielman, D., Chin, F., Hardan, A.
NATURE PUBLISHING GROUP.2017: S206–S207
- **PKM2 activation sensitizes cancer cells to growth inhibition by 2-deoxy-D-glucose** *ONCOTARGET*
Tee, S., Park, J., Hurd, R. E., Brimacombe, K. R., Boxer, M. B., Massoud, T. F., Rutt, B. K., Spielman, D. M.
2017; 8 (53): 90959–68
- **C-Thiourea.** *ACS chemical biology*
Wibowo, A., Park, J. M., Liu, S., Khosla, C., Spielman, D. M.
2017
- **C[Alanine.** *Magnetic resonance in medicine*
Park, J. M., Khemtong, C., Liu, S., Hurd, R. E., Spielman, D. M.
2017; 77 (5): 1741-1748

- **In vivo assessment of intracellular redox state in rat liver using hyperpolarized [1-C-13]Alanine** *MAGNETIC RESONANCE IN MEDICINE*
Park, J. M., Khemtong, C., Liu, S., Hurd, R. E., Spielman, D. M.
2017; 77 (5): 1741-1748
- **GABA editing with macromolecule suppression using an improved MEGA-SPECIAL sequence.** *Magnetic resonance in medicine*
Gu, M., Hurd, R., Noeske, R., Baltusis, L., Hancock, R., Sacchet, M. D., Gotlib, I. H., Chin, F. T., Spielman, D. M.
2017
- **C-pyruvate studies.** *NMR in biomedicine*
Datta, K., Spielman, D. M.
2017; 30 (2)
- **Doublet asymmetry for estimating polarization in hyperpolarized C-13-pyruvate studies** *NMR IN BIOMEDICINE*
Datta, K., Spielman, D. M.
2017; 30 (2)
- **A proton MR spectroscopy study of the thalamus in twins with autism spectrum disorder.** *Progress in neuro-psychopharmacology & biological psychiatry*
Hegarty, J. P., Gu, M., Spielman, D. M., Cleveland, S. C., Hallmayer, J. F., Lazzeroni, L. C., Raman, M. M., Frazier, T. W., Phillips, J. M., Reiss, A. L., Hardan, A. Y.
2017
- **PKM2 activation sensitizes cancer cells to growth inhibition by 2-deoxy-D-glucose.** *Oncotarget*
Tee, S. S., Park, J. M., Hurd, R. E., Brimacombe, K. R., Boxer, M. B., Massoud, T. F., Rutt, B. K., Spielman, D. M.
2017; 8 (53): 90959-68
- **Metabolite-selective hyperpolarized C-13 imaging using extended chemical shift displacement at 9.4 T** *MAGNETIC RESONANCE IMAGING*
Yang, S., Lee, J., Joe, E., Lee, H., Choi, Y., Park, J. M., Spielman, D., Song, H., Kim, D.
2016; 34 (4): 535-540
- **Adipose Cell Size and Regional Fat Deposition as Predictors of Metabolic Response to Overfeeding in Insulin-Resistant and Insulin-Sensitive Humans** *DIABETES*
McLaughlin, T., Craig, C., Liu, L., Perelman, D., Allister, C., Spielman, D., Cushman, S. W.
2016; 65 (5): 1245-1254
- **Hyperpolarized (13) C-lactate to (13) C-bicarbonate ratio as a biomarker for monitoring the acute response of anti-vascular endothelial growth factor (anti-VEGF) treatment.** *NMR in biomedicine*
Park, J. M., Spielman, D. M., Josan, S., Jang, T., Merchant, M., Hurd, R. E., Mayer, D., Recht, L. D.
2016; 29 (5): 650-659
- **Volumetric spiral chemical shift imaging of hyperpolarized [2-(13) c]pyruvate in a rat c6 glioma model.** *Magnetic resonance in medicine*
Park, J. M., Josan, S., Jang, T., Merchant, M., Watkins, R., Hurd, R. E., Recht, L. D., Mayer, D., Spielman, D. M.
2016; 75 (3): 973-984
- **Assessing inflammatory liver injury in an acute CCl4 model using dynamic 3D metabolic imaging of hyperpolarized [1-C-13]pyruvate** *NMR IN BIOMEDICINE*
Josan, S., Billingsley, K., Orduna, J., Park, J. M., Luong, R., Yu, L., Hurd, R., Pfefferbaum, A., Spielman, D., Mayer, D.
2015; 28 (12): 1671-1677
- **Multivendor implementation and comparison of volumetric whole-brain echo-planar MR spectroscopic imaging** *MAGNETIC RESONANCE IN MEDICINE*
Sabati, M., Sheriff, S., Gu, M., Wei, J., Zhu, H., Barker, P. B., Spielman, D. M., Alger, J. R., Maudsley, A. A.
2015; 74 (5): 1209-1220
- **Hyperpolarized 13C NMR observation of lactate kinetics in skeletal muscle.** *journal of experimental biology*
Park, J. M., Josan, S., Mayer, D., Hurd, R. E., Chung, Y., Bendahan, D., Spielman, D. M., Jue, T.
2015; 218: 3308-3318
- **Assessing inflammatory liver injury in an acute CCl4 model using dynamic 3D metabolic imaging of hyperpolarized [1-(13) C]pyruvate.** *NMR in biomedicine*
Josan, S., Billingsley, K., Orduna, J., Park, J. M., Luong, R., Yu, L., Hurd, R., Pfefferbaum, A., Spielman, D., Mayer, D.
2015

- **Metabolite-selective hyperpolarized (13)C imaging using extended chemical shift displacement at 9.4T.** *Magnetic resonance imaging*
Yang, S., Lee, J., Joe, E., Lee, H., Choi, Y. S., Park, J. M., Spielman, D., Song, H. T., Kim, D. H.
2015
- **Association of Metabolite Concentrations and Water Diffusivity in Normal Appearing Brain Tissue with Glioma Grade** *JOURNAL OF NEUROIMAGING*
Maudsley, A. A., Roy, B., Gupta, R. K., Sheriff, S., Awasthi, R., Gu, M., Husain, N., Mohakud, S., Behari, S., Spielman, D. M.
2014; 24 (6): 585-589
- **The feasibility of assessing branched-chain amino acid metabolism in cellular models of prostate cancer with hyperpolarized [1-(13)C]-ketoisocaproate.** *Magnetic resonance imaging*
Billingsley, K. L., Park, J. M., Josan, S., Hurd, R., Mayer, D., Spielman-Sun, E., Nishimura, D. G., Brooks, J. D., Spielman, D.
2014; 32 (7): 791-795
- **Dynamic metabolic imaging of hyperpolarized [2-(13) C]pyruvate using spiral chemical shift imaging with alternating spectral band excitation.** *Magnetic resonance in medicine*
Josan, S., Hurd, R., Park, J. M., Yen, Y., Watkins, R., Pfefferbaum, A., Spielman, D., Mayer, D.
2014; 71 (6): 2051-2058
- **Hyperpolarized [1,4-C-13]-diethylsuccinate: a potential DNP substrate for in vivo metabolic imaging** *NMR IN BIOMEDICINE*
Billingsley, K. L., Josan, S., Park, J. M., Tee, S. S., Spielman-Sun, E., Hurd, R., Mayer, D., Spielman, D.
2014; 27 (3): 356-362
- **Improved Slice-Selective Adiabatic Excitation** *MAGNETIC RESONANCE IN MEDICINE*
Balchandani, P., Glover, G., Pauly, J., Spielman, D.
2014; 71 (1): 75-82
- **In vivo investigation of cardiac metabolism in the rat using MRS of hyperpolarized [1-(13) C] and [2-(13) C]pyruvate.** *NMR in biomedicine*
Josan, S., Park, J. M., Hurd, R., Yen, Y., Pfefferbaum, A., Spielman, D., Mayer, D.
2013; 26 (12): 1680-1687
- **Prospective neurochemical characterization of child offspring of parents with bipolar disorder.** *Psychiatry research*
Singh, M. K., Jo, B., Adleman, N. E., Howe, M., Bararpour, L., Kelley, R. G., Spielman, D., Chang, K. D.
2013; 214 (2): 153-160
- **Prospective neurochemical characterization of child offspring of parents with bipolar disorder** *PSYCHIATRY RESEARCH-NEUROIMAGING*
Singh, M. K., Jo, B., Adleman, N. E., Howe, M., Bararpour, L., Kelley, R. G., Spielman, D., Chang, K. D.
2013; 214 (2): 153-160
- **Exchange-linked dissolution agents in dissolution-DNP (13)C metabolic imaging.** *Magnetic resonance in medicine*
Hurd, R. E., Spielman, D., Josan, S., Yen, Y., Pfefferbaum, A., Mayer, D.
2013; 70 (4): 936-942
- **Effects of Isoflurane Anesthesia on Hyperpolarized C-13 Metabolic Measurements in Rat Brain** *MAGNETIC RESONANCE IN MEDICINE*
Josan, S., Hurd, R., Billingsley, K., Senadheera, L., Park, J. M., Yen, Y., Pfefferbaum, A., Spielman, D., Mayer, D.
2013; 70 (4): 1117-1124
- **Exchange-Linked Dissolution Agents in Dissolution-DNP C-13 Metabolic Imaging** *MAGNETIC RESONANCE IN MEDICINE*
Hurd, R. E., Spielman, D., Josan, S., Yen, Y., Pfefferbaum, A., Mayer, D.
2013; 70 (4): 936-942
- **Measuring mitochondrial metabolism in rat brain in vivo using MR Spectroscopy of hyperpolarized [2-(13) C]pyruvate.** *NMR in biomedicine*
Park, J. M., Josan, S., Grafendorfer, T., Yen, Y., Hurd, R. E., Spielman, D. M., Mayer, D.
2013; 26 (10): 1197-1203
- **Effects of isoflurane anesthesia on hyperpolarized (13)C metabolic measurements in rat brain.** *Magnetic resonance in medicine*
Josan, S., Hurd, R., Billingsley, K., Senadheera, L., Park, J. M., Yen, Y., Pfefferbaum, A., Spielman, D., Mayer, D.
2013; 70 (4): 1117-1124
- **Aberrant basal ganglia metabolism in fragile X syndrome: a magnetic resonance spectroscopy study** *JOURNAL OF NEURODEVELOPMENTAL DISORDERS*

- Bruno, J. L., Shelly, E. W., Quintin, E., Rostami, M., Patnaik, S., Spielman, D., Mayer, D., Gu, M., Lightbody, A. A., Reiss, A. L.
2013; 5
- **In vivo measurement of aldehyde dehydrogenase-2 activity in rat liver ethanol model using dynamic MRSI of hyperpolarized [1-(13) C]pyruvate.** *NMR in biomedicine*
Josan, S., Xu, T., Yen, Y., Hurd, R., Ferreira, J., Chen, C., Mochly-Rosen, D., Pfefferbaum, A., Mayer, D., Spielman, D.
2013; 26 (6): 607-612
 - **Utility of multiparametric 3-T MRI for glioma characterization.** *Neuroradiology*
Roy, B., Gupta, R. K., Maudsley, A. A., Awasthi, R., Sheriff, S., Gu, M., Husain, N., Mohakud, S., Behari, S., Pandey, C. M., Rathore, R. K., Spielman, D. M., Alger, et al
2013; 55 (5): 603-613
 - **Metabolic response of glioma to dichloroacetate measured in vivo by hyperpolarized C-13 magnetic resonance spectroscopic imaging** *NEURO-ONCOLOGY*
Park, J. M., Recht, L. D., Josan, S., Merchant, M., Jang, T., Yen, Y., Hurd, R. E., Spielman, D. M., Mayer, D.
2013; 15 (4): 433-441
 - **Quantification of glutamate and glutamine using constant-time point-resolved spectroscopy at 3 T** *NMR IN BIOMEDICINE*
Gu, M., Zahr, N. M., Spielman, D. M., Sullivan, E. V., Pfefferbaum, A., Mayer, D.
2013; 26 (2): 164-172
 - **Association of metabolite concentrations and water diffusivity in normal appearing brain tissue with glioma grade.** *Journal of neuroimaging : official journal of the American Society of Neuroimaging*
Maudsley, A. A., Roy, B., Gupta, R. K., Sheriff, S., Awasthi, R., Gu, M., Husain, N., Mohakud, S., Behari, S., Spielman, D. M.
2013; 24 (6): 585-89
 - **Aberrant basal ganglia metabolism in fragile X syndrome: a magnetic resonance spectroscopy study.** *Journal of neurodevelopmental disorders*
Bruno, J. L., Shelly, E. W., Quintin, E., Rostami, M., Patnaik, S., Spielman, D., Mayer, D., Gu, M., Lightbody, A. A., Reiss, A. L.
2013; 5 (1): 20-?
 - **Metabolite kinetics in C6 rat glioma model using magnetic resonance spectroscopic imaging of hyperpolarized [1-13C]pyruvate** *MAGNETIC RESONANCE IN MEDICINE*
Park, J. M., Josan, S., Jang, T., Merchant, M., Yen, Y., Hurd, R. E., Recht, L., Spielman, D. M., Mayer, D.
2012; 68 (6): 1886-1893
 - **Application of hyperpolarized [1-13C]lactate for the in vivo investigation of cardiac metabolism** *NMR IN BIOMEDICINE*
Mayer, D., Yen, Y., Josan, S., Park, J. M., Pfefferbaum, A., Hurd, R. E., Spielman, D. M.
2012; 25 (10): 1119-1124
 - **Neurometabolite Effects of Response to Quetiapine and Placebo in Adolescents with Bipolar Depression** *JOURNAL OF CHILD AND ADOLESCENT PSYCHOPHARMACOLOGY*
Chang, K., DelBello, M., Chu, W., Garrett, A., Kelley, R., Mills, N., Howe, M., Bryan, H., Adler, C., Eliassen, J., Spielman, D., Strakowski, S. M.
2012; 22 (4): 261-268
 - **Fast volumetric imaging of ethanol metabolism in rat liver with hyperpolarized [1-13C]pyruvate** *NMR IN BIOMEDICINE*
Josan, S., Spielman, D., Yen, Y., Hurd, R., Pfefferbaum, A., Mayer, D.
2012; 25 (8): 993-999
 - **Self-Refocused Adiabatic Pulse for Spin Echo Imaging at 7 T** *MAGNETIC RESONANCE IN MEDICINE*
Balchandani, P., Khalighi, M. M., Glover, G., Pauly, J., Spielman, D.
2012; 67 (4): 1077-1085
 - **Quantification of in vivo metabolic kinetics of hyperpolarized pyruvate in rat kidneys using dynamic C-13 MRSI** *NMR IN BIOMEDICINE*
Xu, T., Mayer, D., Gu, M., Yen, Y., Josan, S., Tropp, J., Pfefferbaum, A., Hurd, R., Spielman, D.
2011; 24 (8): 997-1005
 - **In vivo MRSI of hyperpolarized [1-C-13]pyruvate metabolism in rat hepatocellular carcinoma** *NMR IN BIOMEDICINE*
Darpolor, M. M., Yen, Y., Chua, M., Xing, L., Clarke-Katzenberg, R. H., Shi, W., Mayer, D., Josan, S., Hurd, R. E., Pfefferbaum, A., Senadheera, L., So, S., Hofmann, et al
2011; 24 (5): 506-513

- **Detection of Inflammatory Arthritis by Using Hyperpolarized C-13-Pyruvate with MR Imaging and Spectroscopy** *RADIOLOGY*
MacKenzie, J. D., Yen, Y., Mayer, D., Tropp, J. S., Hurd, R. E., Spielman, D. M.
2011; 259 (2): 414-420
- **Dynamic and High-Resolution Metabolic Imaging of Hyperpolarized [1-C-13]-Pyruvate in the Rat Brain Using a High-Performance Gradient Insert** *MAGNETIC RESONANCE IN MEDICINE*
Mayer, D., Yen, Y., Takahashi, A., Josan, S., Tropp, J., Rutt, B. K., Hurd, R. E., Spielman, D. M., Pfefferbaum, A.
2011; 65 (5): 1228-1233
- **Application of double spin echo spiral chemical shift imaging to rapid metabolic mapping of hyperpolarized [1-C-13]-pyruvate** *JOURNAL OF MAGNETIC RESONANCE*
Josan, S., Yen, Y., Hurd, R., Pfefferbaum, A., Spielman, D., Mayer, D.
2011; 209 (2): 332-336
- **Neurochemical deficits in the cerebellar vermis in child offspring of parents with bipolar disorder** *BIPOLAR DISORDERS*
Singh, M. K., Spielman, D., Libby, A., Adams, E., Acquaye, T., Howe, M., Kelley, R., Reiss, A., Chang, K. D.
2011; 13 (2): 189-197
- **MR Spectroscopy for Assessment of Memantine Treatment in Mild to Moderate Alzheimer Dementia** *JOURNAL OF ALZHEIMERS DISEASE*
Ashford, J. W., Adamson, M., Beale, T., La, D., Hernandez, B., Noda, A., Rosen, A., O'Hara, R., Fairchild, J. K., Spielman, D., Yesavage, J. A.
2011; 26: 331-336
- **Imaging the Alzheimer Brain** *JOURNAL OF ALZHEIMERS DISEASE*
Ashford, J. W., Salehi, A., Furst, A., Bayley, P., Frisoni, G. B., Jack, C. R., Sabri, O., Adamson, M. M., Coburn, K. L., Olichney, J., Schuff, N., Spielman, D., Edland, et al
2011; 26: 1-27
- **Cerebral dynamics and metabolism of hyperpolarized [1-C-13]pyruvate using time-resolved MR spectroscopic imaging** *JOURNAL OF CEREBRAL BLOOD FLOW AND METABOLISM*
Hurd, R. E., Yen, Y., Tropp, J., Pfefferbaum, A., Spielman, D. M., Mayer, D.
2010; 30 (10): 1734-1741
- **Designing Adiabatic Radio Frequency Pulses Using the Shinnar-Le Roux Algorithm** *MAGNETIC RESONANCE IN MEDICINE*
Balchandani, P., Pauly, J., Spielman, D.
2010; 64 (3): 843-851
- **In vivo application of sub-second spiral chemical shift imaging (CSI) to hyperpolarized C-13 metabolic imaging: Comparison with phase-encoded CSI** *JOURNAL OF MAGNETIC RESONANCE*
Mayer, D., Yen, Y., Levin, Y. S., Tropp, J., Pfefferbaum, A., Hurd, R. E., Spielman, D. M.
2010; 204 (2): 340-345
- **Brain glutamatergic characteristics of pediatric offspring of parents with bipolar disorder** *PSYCHIATRY RESEARCH-NEUROIMAGING*
Singh, M., Spielman, D., Adleman, N., Alegria, D., Howe, M., Reiss, A., Chang, K.
2010; 182 (2): 165-171
- **Metabolic Imaging in the Anesthetized Rat Brain Using Hyperpolarized [1-C-13] Pyruvate and [1-C-13] Ethyl Pyruvate** *MAGNETIC RESONANCE IN MEDICINE*
Hurd, R. E., Yen, Y., Mayer, D., Chen, A., Wilson, D., Kohler, S., Bok, R., Vigneron, D., Kurhanewicz, J., Tropp, J., Spielman, D., Pfefferbaum, A.
2010; 63 (5): 1137-1143
- **Evaluation of Dynamic Contrast-Enhanced MRI in Detecting Renal Scarring in a Rat Injury Model** *JOURNAL OF MAGNETIC RESONANCE IMAGING*
Wang, B., Sommer, G., Spielman, D., Shortliffe, L. M.
2010; 31 (5): 1132-1136
- **T-2 relaxation times of C-13 metabolites in a rat hepatocellular carcinoma model measured in vivo using C-13-MRS of hyperpolarized [1-C-13]pyruvate** *NMR IN BIOMEDICINE*
Yen, Y., Le Roux, P., Mayer, D., King, R., Spielman, D., Tropp, J., Pauly, K. B., Pfefferbaum, A., Vasanawala, S., Hurd, R.
2010; 23 (4): 414-423
- **Breathheld Autocalibrated Phase-Contrast Imaging** *JOURNAL OF MAGNETIC RESONANCE IMAGING*
Lew, C., Alley, M. T., Spielman, D. M., Bammer, R., Chan, F. P.

2010; 31 (4): 1004-1014

- **Hyperpolarized C-13 MRSI for Therapeutic Response Monitoring of Prostate Cancer to Radiotherapy** *52nd Annual Meeting of the American-Society-for-Therapeutic-Radiation-Oncology (ASTRO)*
Senadheera, L., Mayer, D., Darpolor, M. M., Yen, Y., Luong, R., Spielman, D. M., Xing, L.
ELSEVIER SCIENCE INC.2010: S116–S116
- **Methods for Metabolic Evaluation of Prostate Cancer Cells Using Proton and C-13 HR-MAS Spectroscopy and [3-C-13] Pyruvate as a Metabolic Substrate** *MAGNETIC RESONANCE IN MEDICINE*
Levin, Y. S., Albers, M. J., Butler, T. N., Spielman, D., Peehl, D. M., Kurhanewicz, J.
2009; 62 (5): 1091-1098
- **Application of Subsecond Spiral Chemical Shift Imaging to Real-Time Multislice Metabolic Imaging of the Rat In Vivo after Injection of Hyperpolarized C-13(1)-Pyruvate** *MAGNETIC RESONANCE IN MEDICINE*
Mayer, D., Yen, Y., Tropp, J., Pfefferbaum, A., Hurd, R. E., Spielman, D. M.
2009; 62 (3): 557-564
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